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METHOD FOR MANUFACTURING PILE KNITTED AND WOVEN FABRICS WITH EXCELLENT INSULATION

[Hoonsei No Sugureta Pairu Amiorimono No Seizoho]

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Specification

1. Title of the invention

Method for Manufacturing Pile Knitted and Woven Fabrics with Excellent Insulation

2. Claims

1. A method for manufacturing pile knitted and woven fabrics with excellent insulation, characterized by the fact that the hair tip parts of pile knitted and woven fabrics are sufficiently divided and opened; and a binder containing far-infrared radioactive inorganic particles is sprayed on said hair tip parts.

2. The method for manufacturing pile knitted and woven fabrics with excellent insulation of Claim 1, characterized by including one or two or more far-infrared radioactive inorganic powders selected from a group comprised of zirconium oxide, cobalt oxide, iron oxide, manganese oxide, copper oxide,

[1] Numbers in the margin indicate pagination in the foreign text.

titanium oxide, silicon oxide, silicon carbide, chromium oxide, and aluminum oxide.

3. Detailed explanation of the invention

(Industrial application field)

The present invention pertains to a method that adheres far-infrared radioactive inorganic particles to the hair tips of pile knitted and woven fabrics.

(Prior art)

Pile knitted and woven fabrics are generally composed of natural fibers such as cottons and wools and synthetic fibers such as acryl fibers and polyester fibers. These pile knitted and woven fabrics are usually required to have insulation, and for example, the insulation is improved by lengthening the length of the pile or improving the density, especially mixed-spinning wools with good insulation at high efficiency. However, there is a limit in the improvement of the insulation, and a special measure is required to overcome the limit.

On the other hand, it is known that far-infrared radioactive inorganic particles are adhered to cloths for body thermotherapy and insulation. However, it is not known that the far-infrared radioactive inorganic particles are adhered to the pile knitted and woven fabrics. In particular, it is known that

these particles are given only to the hair tip parts of the pile knitted and woven fabrics.

(Problems to be solved by the invention)

However, it is not easy to uniformly and strongly adhere the far-infrared radioactive inorganic particles with poor adhesion such as sand particles only to the hair tip parts of the pile knitted and woven fabrics.

The present invention solves these problems, and the pile knitted and woven fabrics to which the far-infrared radioactive inorganic particles are given are worn while setting the hair tips to the inside, so that excellent insulation and medical effect are obtained.

(Means to solve the problems)

In order to achieve the above-mentioned purpose, the present invention is characterized by the fact that the hair tip parts of pile knitted and woven fabrics are sufficiently divided and opened and a binder containing far-infrared radioactive inorganic particles is sprayed on said hair tip parts.

As the material of the pile knitted and woven fabrics to which the present invention is applied, natural fibers such as cotton and wool, synthetic fibers such as acryl fibers and polyester fibers, or these mixed-spun and union-knitted products are used, and in terms of insulation and sense of wearing,

moisture-absorbing fibers such as cotton and wool are preferable. The knitting and weaving structures of the pile knitted and woven fabrics are not particularly limited, and the piles are also either a loop shape or a fiber-open shape.

The far-infrared radioactive inorganic particles being used in the present invention are ceramic particles for radiating far-infrared rays with a wavelength of 4-25 μ having the best efficiency to the human body at a temperature near the body temperature. For example, one kind or a mixture of two kinds or more of cobalt oxide, iron oxide, zirconium oxide, manganese oxide, copper oxide, titanium oxide, silicon oxide, silicon carbide, chromium oxide, aluminum oxide, and silicon carbide, etc., is used. These inorganic particles are used as a sintered body with betalite, cojelite, mullite, clay, etc. The size of these inorganic particles is preferably 0.1-30 μ.

Also, these inorganic particles are used by mixing with a binder, and as the binder, resins with soft hand and good adhesion with the piles of the pile knitted and woven fabrics, for example, urethane group elastomer resin and acrylic ester group resin are used. They are used by dissolving in a solvent such as toluene and ordinarily, emulsifying and diluting it with water.

In spraying the above-mentioned binder containing the inorganic particles, it is necessary to sufficiently open the pile surface of the pile knitted and woven fabrics, especially the hair tip parts. Next, the binder mixed with the above-mentioned far-infrared radioactive inorganic particles is adhered to the hair tip parts of said pile knitted and woven fabrics by spraying, and at that time, a consideration is preferably taken so that the hair tips may not be adhered to each other.

After spraying the binder, if necessary, a lubricant such as amino-modified silicone resin oil is sprayed on the above-mentioned pile knitted and woven fabrics to improve the slip, and finishing processes such as hair dividing, polishing, and hair shearing are further applied to the fabric.

Also, if necessary, the above-mentioned inorganic particle-included binder may be further rendered to the back face of the pile knitted and woven fabrics. Its means may be a spray method or an ordinary back pasting method.

The structures of the pile knitted and woven fabrics to which the far-infrared radioactive inorganic particles are given are explained using examples shown in the figures. Figures 1 and 2 are respectively enlarged cross sections showing the structure of pile knitted and woven fabrics obtained by the

method of the present invention. In Figure 1, pile yarns (3) are inserted into a fabric structure woven by warps (1) and wefts (2), and binders (5) containing far-infrared radioactive inorganic particles are adhered to the hair tip parts (4).

Also, in Figure 2, the binders (5) containing far-infrared radioactive inorganic particles are adhered to the hair tip parts (4) of the pile yarns (3) similarly to Figure 1, and the binder layer (6) containing far-infrared radioactive inorganic particles is also installed on the back face of the fabric structure.

Next, the present invention is further explained by application examples.

(Application examples)

Application Example 1

In the manufacture of a double-faced wool pile woven fabric, 100% acryl fibers (2/52) were used as base warps, 100% polyester fibers (30/2) were used as base wefts for drawing out the pile, and 100% anti-crimp wools (2/32) were used as pile yarns. Yarns with a twisting coefficient of α = 67 and the upper and lower ratio of 55% were used, the pile length was 6 mm in the surface and 6.5 mm in the back face, and the injection density was set to 50 pieces/inch. The base warps were fed through a dropper at only the lower part, and the pile yarns

were passed through a driving roller and an auxiliary roller, passed through the dropper and a belt, fed to a double weaving part, and woven by 10% structure. The pile yarns hanged over the woven fabric were cut at its central part, so that two sheets of pile woven fabric were prepared. The Metsuke of the raw fabric was 864 g/m. The piles were drawn out by extracting the wefts of the back face of the raw fabric, so that a double-faced pile woven fabric was formed. The woven fabric was dyed with a beige color by an acid dye using a wince dyeing /3 machine, softened, and dried by a tumbler dryer. Then, the hairs of both the surface and the back face were sufficiently divided, and the surface area was increased by opening the fibers of the pile parts.

On the other hand, a metal oxide mixture of 60% MnO_2, 20% Fe_2O_3, 10% CuO, and 10% CoO was temporarily baked at 1,200°C, and 30% of the temporarily baked product was mixed with cojelite, and baked at 1,150°C, and crushed at 1-20 μ, so that an inorganic powder was formed. 15% of the inorganic powder, 30% urethane resin, 15% acrylic ester resin, and 40% water were mixed and stirred, so that a raw solution for treatment was prepared.

Water was added at a ratio of the raw solution and the water of 1:1 to the raw solution, dispersed and mixed, sprayed at an apparent amount of 200 g/M on the surface of the pile

woven fabric, extended by a tenter, and dried. Furthermore, a treatment similar to the above-mentioned treatment was also applied to the back face of the pile woven fabric, and the hairs of the surface and the back face of the raw fabric were divided and sheared, so that a double-faced wool fabric was obtained. In the double-face wool fabric, in addition to the insulation of the main body of the wool, the improvement of the sensible temperature due to the far-infrared radiation of the attached inorganic powder was recognized, so that the blood circulation was increased.

Application Example 2

Acryl group fibers (1/14) were used as pile yarns, and acryl fibers (1/52) were used as base yarns. A pile knitted fabric was formed at a drawing of 38 mm and a density of 13 by a 16G seal milling cutter machine, and the hairs of the pile surface were sufficiently divided and opened.

On the other hand, 15% of the same inorganic powder as that of Application Example 1 for radiating far-infrared rays, 30% urethane resin, 10% toluene, 20% acrylic ester, and 25% water were mixed and stirred, so that a raw solution was prepared. Acrylic ester resin and water were added to the raw solution at a ratio of 1.5:1:1, mixed and stirred, sprayed at a ratio of 300 g/m (apparent amount) on the pile surface of the pile knitted

fabric by a nozzle, extended by a tenter, and dried. The piles of the raw fabric were divided, polished at 140-100°C four times by a polisher, and the pile tips were sheared and polished. As a result, a pile knitted fabric with a Metsuke of 450 g/m was formed. Using the raw fabric, a vest and an inner sole of a shoe were made. The vest had an effect as an insulating vest. In other words, the attached inorganic powder is warmed by the body temperature, and the far-infrared rays are radiated, so that the insulation effect is improved. On the other hand, the inner sole of the shoe obtained a sense of refreshing and drying by the effect of the far-infrared radioactive inorganic powder, without wetting the foots.

Application Example 3

Bulky yarns of acryl fibers (2/32) were used as pile yarns, and paralleled yarns of acryl fiber (1/52) yarns and polyester (150d) processed yarns were used as base yarns. A pile knitted fabric was formed at a drawing of 19 mm and a density of 12 by a seal milling cutter machine.

On the other hand, 20% of the same inorganic powder as that of Application Example 1 for radiating far-infrared rays, 35% urethane resin, 10% toluene, 10% acrylic ester, and 35% water were mixed and stirred, so that a raw solution was prepared. Acrylic ester resin and water were added to the raw solution at

a ratio of 1:1:1, mixed and stirred, sprayed at an apparent amount of 300 g/m on the back face of the knitted fabric, extended by a tenter, and dried. The piles of the raw fabric were sufficiently loosened by a hair divider, and water mixed and stirred at a ratio of the raw solution of the above-mentioned inorganic powder and the water of 1:2, sprayed at an apparent amount of 300 g/m on the pile surface of the knitted fabric, extended by a tenter, and dried. The pile parts of the raw fabric were re-divided and loosened, and the tips of the pile yarns were sheared. Using the raw fabric, an insulating vest was prepared. As a result, the attached far-infrared radioactive inorganic powder was warmed by the body temperature. On the other hand, the pile knitted fabric in which the hairs were loosened was dried again by a tumbler, formed as a pad-shaped knitted fabric, and used as an inner sole of a shoe. As a result, a refreshing and drying effect was recognized.

Application Example 4

Similarly to Application Example 1, tip-dyed cotton yarns (30/2) as pile yarns, cotton yarns (40/2) as base warps, and 100% polyester (40/2) as base weft yarns were used, and a double-faced pile woven fabric with a wing of 22, a 12% structure, a pile length of 3 m/m, and an injection of 62

pieces/in was prepared. The Mestsuke of the raw fabric was 669 g/m.

On the other hand, 15% of the same inorganic powder as that of Application Example 1 for radiating far-infrared rays, 30% urethane resin, 15% acrylic ester resin, and 40% water were mixed and stirred, so that a raw solution was prepared. /4

Acrylic ester resin and water were dispersed and mixed with the raw solution at a ratio of 1:1:1, sprayed at an apparent amount of 300 g/m on the surface and the back face of the above-mentioned double-faced pile woven fabric (before drawing the wefts), extended, and dried.

Then, the piles of the surface were drawn out to the back face by drawing four pieces out of 12 pieces of the polyester wefts (40/2) of the back face of the double-faced pile woven fabric sprayed.

The inorganic powder for radiating far-infrared rays remained in an adhered state to the base yarns, and a sandwich was formed by inserting the surface and back pile cottons. The surface and the back face of the piles were divided, sheared, and finished. 100% double-faced cotton fabric was obtained by cutting the finished fabric into 200 cm. This wool fabric improved the sensible temperature by the far-infrared radiation

of the attached inorganic oxide, and the blood circulation was improved.

(Effects of the invention)

As mentioned above, according to the present invention, for pile knitted and woven fabrics composed of any of natural fibers, recycled fibers, and synthetic fibers, far-infrared radioactive inorganic particles can be uniformly and strongly given to the hair tip parts of the piles.

Then, the pile knitted and woven fabrics to which the far-infrared radioactive inorganic particles are given are effectively used for vests, liners of coats, mats for preventing a floor slip, inner soles of shoes, hot carpet cover sheets, etc., and can also be uniformly and softly given to interior sleeping goods such as sleeping sheets and double-faced blanks. Thus, a wide utilization value is recognized in the present invention.

In particular, when knitted and woven fabric in which moisture-absorbing fibers such as cotton and wool are used as pile yarns and a binder containing far-infrared radioactive inorganic particles is given to the hair tips of the pile yarns are worn while placing said hair tip part toward the side opposite to the human body, the human body is effectively kept warm, and the blood vessels are expanded by the permeation of

far-infrared rays into the deep skin part, so that the blood circulation is improved. Thereby, the entire human body as well as the local parts is warmed. Also, since moisture such as sweat being dispersed from the human body surface permeates into the hydrophobic binder part and is absorbed in the moisture-absorbing fiber part of the deep pile part, the part in contact with the skin has a very good sense of refreshing.

4. Brief description of the figures

Figures 1 and 2 are enlarged cross sections showing the structure of pile knitted and woven fabrics obtained by the method of the present invention.

1 Warp

2 Weft

3 Pile yarn

4 Hair tip part

5 Binder

6 Binder layer of the back face of knitted and woven fabrics

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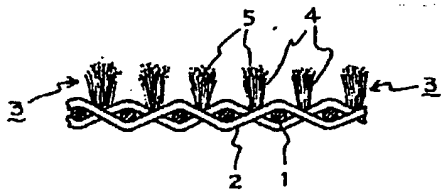

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